

AMERICAN

Cinematographer

SERVING ALL FIELDS
OF MOTION PICTURE
PRODUCTION

The Magazine of Motion Picture Photography



SPECIAL
IN THIS
ISSUE

- Why MGM Chose Camera 65
- Lip-Sync Sound With Any Union Camera
- Why Edge-Numbering Pays Dividend
- Sharp Focus Safety With Hyperical Distance



"For quality picture control every time—

GIVE ME FINE TONAL GRADATION OF 'SUPERIOR' 2"

So says Sol Rozman, well-known Director of Photography, shown here at work for James Love Productions on a sales training film for Universal C. I. T. Credit Corporation.

"I've used DuPont Type 936 Superior® 2 since it first became available," Sol continues, "and find that it consistently gives me the effects I want to create, in *any* lighting situation." Sol chose "Superior" 2 for this James A. Love production because, as he puts it, "abstract sets create a particularly difficult

lighting problem. The excellent subject separation of 'Superior' 2 is a must."

Another thing Sol likes is the versatility of this DuPont film. "It's ideal for filming television commercials, where extreme close-ups are so often necessary. Here's where what I call the 'gray tone quality' of 'Superior' 2 really pays off. The combination of wide latitude and fine separation of delicate tones results in much better telecasted detail."

"Superior" 2 is just one of the fine DuPont films for every motion picture need. These films—and complete technical data on them—are available through the DuPont Photo Products sales offices below.

Sol Rozman checks his lighting and composition on an abstract set.



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High Speed Type 242

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Part VIII in the series on professional motion picture cameras.

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ON THE COVER

SHOOTING A SCENE on location for James Stewart's "The Egyptian King," photographed by Boris Kaufman, A.S.C. A highly-technical fellow shot all story scenes. Kaufman and James Wardward, photo shows some of the equipment and techniques employed to film it. The Mitchell camera is mounted on a small camera crane, which is on raised platform enabling camera to be lowered close to ground level and still be unobtrusive. Grip holds large white scrim above camera to diffuse light. Word machine in background is running at reduced speed to provide a gentle breeze for the scene, while in far background are three reflections throwing back-light into scene. Note movieplate on a "Telephoto" being carried by technician just ahead of main camera.

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FIRST TRULY PROFESSIONAL 16MM MOTION PICTURE CAMERA

UNIVERSITY OF OKLAHOMA and Bud
Winstein Productions use Mitchell
Director, Ned Hickman (below)

FOR JONES UNIVERSITY see above
students and staff using Mitchell Cam-
eras Director, Katherine Garbade (right)

UNIVERSITY OF MIAMI TV Film Depart-
ment cameras are on location with
Chairman Mitchell, Director G. Ben
Carter, Reed (below)



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INDUSTRY NEWS

Portable 65mm Camera For "Hand-held" Shooting

Paravision, Inc., which engineered the camera and lenses used for the 65mm productions of "The Big Fisherman" and "Ben-Hur," soon will announce a compact hand-held 65mm camera to augment the larger sound-stage cameras. New camera will have a hand-grip and a shoulder support plus a 500-foot capacity film magazine. Weighing but 20 pounds, the camera will be motor driven from a wet-cell battery pack.

Allowance Made for Sound-stripped Film

Increasing interest in use of pre-stripped 16mm negative and several film has resulted in Bach-Auricon increasing the inside diameter of all Auricon single-system sound camera to accommodate the slightly larger rolls of 16mm motion picture film pre-stripped for magnetic recording. Auricon cameras are readily adapted to magnetic recording through installation of low-cost recording unit made by the company, which is installed inside the camera.

SMPTS Conclave To Explore New Film and Video Techniques

The 7-day convention of the Society of Motion Picture and Television Engineers, which opens May 1st at the Ambassador Hotel in Los Angeles, will survey the extraordinary new principles currently being introduced in the film and TV industries. There will be special emphasis placed on the problems and procedures of in-plant motion picture production in a session on Films In Industry.

One of the anticipated highlights of the technical program is the presentation of a progress report on Video Tape Standardization by Charles Anderson of the Ampex Corporation.

A day-long presentation of papers on Space Age Motion Pictures and Television will be one of the major

News briefs of industry activities, products and progress

events of the convention, which concludes May 7th.

Motion Pictures and the Missiles Program

As industry and the military find increasing usefulness in filmed documentaries and reports, more and more defense contractors are getting into the business of making films, reports Jameson Film Company, Dallas, Texas in its monthly industry newsletter *Projections*.

A case in point, says the bulletin, is the Thiokol Corporation, manufacturer of the rockets that make some of the U.S. missiles and space vehicles go. Thiokol recently staffed its engineering department with three experienced film producers and assigned them to the company's various rocket projects to handle their respective film requirements.

Reflecting the changes taking place in industry film production is fact that only a few months ago the company's motion picture activities were confined almost entirely to instrumentation. Last month the company had three commercial motion picture films in production, with others scheduled to get underway soon.

Creators of VistaVision Switching to Technicolor

Paramount Studios, which launched its VistaVision wide-screen system several years ago as its answer to 20th Century-Fox's CinemaScope, has decided to make a gradual changeover to Technicolor for the studio's future color productions. Technicolor, which is an adaptation of VistaVision to Technicolor cameras, employs VV's horizontal film transport system and double-frame picture area.

The launching of VistaVision involved the reconstruction of special cameras for Paramount by Mitchell Camera Corporation, the majority of which were extensively used in the photography of Cecil B. DeMille's "The Ten Commandments."

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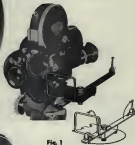


Fig. 1
Finder Position
For 50mm Lens

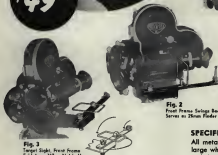


Fig. 2
Front Frame Swings Back
Serves as 25mm Finder

Fig. 3
Target Sight, Front Frame
Fold Away When Not in Use

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WHAT'S NEW

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Reflex Viewer

Available from Century Precision Photographic Equip. Co., 10659 Burbank Blvd., North Hollywood, Calif., is a precision, beam-splitter type reflex focusing attachment for 16mm cameras that permits focusing and viewing through the lens while camera is in operation. Designed for use with short-mounted lenses over 13mm focal length for infinity use or with any 16mm C-mount lens for closeups, image is observed on fine ground glass by means of a 7-X adjustable eyepiece. Models are available for Cinema lenses. Prices start at \$79.50.



High-speed Fastax Camera

The new Wollensak WF-ST high-speed Fastax motion picture camera features a 2-sided prism of high-index glass, faster shutter speed, 10% more frame height, and a speed range from 150 to 6,000 pps. Higher resolution over entire frame and more uniform frame density is claimed. Other features include viewfinder, timing light, cut-off switch, 100-ft. daylight loading capacity, no motor interchange required for achieving full speed runs, and provision for slit apertures. List price is \$1,995, F.O.B. Rochester, N.Y. A 900-ft. version of camera is also available.



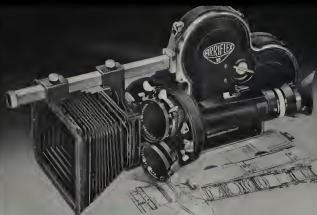
16mm Anamorphic Lens

An anamorphic lens that will convert any 16mm projector for showing CinemaScope format films is announced by Victor Anamograph Corp., Plainville, Conn. Called the Vicscope, new lens may also be used as a supplementary cinema lens for photographing in the CinemaScope format. Special adaptors to fit most cameras are available from the manufacturer. Company also supplies brackets for mounting lens on Victor and other 16mm projectors, the latter on special order. List price of lens is \$169.50. Literature is available.



Target Finder

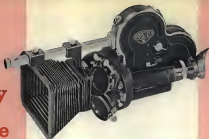
A lightweight target sight for use with Arriflex cameras, and adjustable for both 25mm and 50mm lenses, is offered by Birns & Sawyer, 6124 Santa Monica Blvd., Hollywood 38, Calif. The accessory is mounted on camera by means of a conventional tripod stud or secured by the screw of a camera pistol grip. Horizontal framing of front sight element is exactly parallel with top and bottom of film frame lines. Both the front frame and rear target sight are collapsible on a spring-loaded mount. List price is \$49.50, F.O.B. Hollywood.



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reliability has become the most
popular portable professional
motion picture camera
in America today ”**

(Quoted from a four-page editorial in "The American Cinematographer")

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The many hundreds of new purchases of the Arriflex 16 by industry, government, military services, and educational institutions are proof of the convincing superiority of this outstanding camera as factually stated in this insert. And the partial list of satisfied users is our most convincing recommendation.

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**Because it is
rugged and reliable**

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And for the recent South Pole Expedition—1967-1968—where Disney Productions filmed "The Seven Cities of Antarctica," Arri 16's again were selected for major filming.

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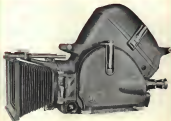
A modern, fully equipped service center is maintained in New York City, manned by factory trained technicians. A complete stock of Arriflex parts is always on hand. Because Arriflex owners derive their income through the use of their camera, service is handled on the promptest possible basis—in most instances within 24 hours.

**Because of its
reasonable price**

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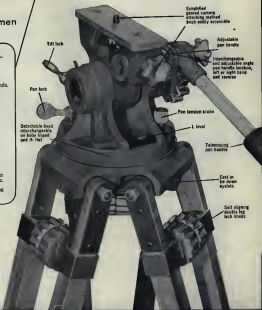
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QUESTIONS & ANSWERS

Need advice on a picture-making problem? Your questions are invited and will be answered by mail. Questions and answers considered of general interest will appear in this column each month.



Q For a great many years, the industry's film laboratories have experimented with different dopes and gums, worrying about drying time and the after-effects on the search for a sure, safe method for cleaning film. Other industries have been using the science of ultrasonics for cleaning purposes—particularly the electronics and optics fields, where the finest grain of dust on an instrument's surface can cause untold damage. It seems to me that use of ultrasonics could also be applied to the problem of film cleaning, or would it damage film emulsion?—S.B.

Answer: Your idea is not only practical but is already in use. About a year ago, Lipman-Smith Corp., Chicago, Ill., introduced its CF-2 ultrasonic film cleaning machine, which has been adopted by practically every film laboratory of importance in the industry. The equipment does an excellent job of cleaning negatives before printing. The ultrasonic frequency has no harmful effect whatever on the film emulsion.

Q What should be the ratios of the key light, kicker and back-light on the key light, and how are the ratios determined?—R.A.B.

Answer: Much depends upon the recording medium—film or TV, color or black-and-white, etc. Within the limits established by the recording medium, the ratio may be modified at the will of the director of photography to establish the desired mood. For example, a fast-moving comedy would most likely be shot with relatively high fill light—say, a ratio of 2-to-1 or 3-to-1. A tragic dramatic action, on the other hand, which might be enhanced by black shadows, etc., might call for a ratio of possibly 8-to-1. Inversely the intensity of the kicker and back light relative to the key light are visually established by the director of photography to suit the mood or pictorial effect aimed for.

Q What is the procedure in photographing day-for-night scenes with people in them in color and also in black-and-white?—P.C.C.

Answer: To photograph such scenes in color, use Type "A" color film without the 35A Wratten (orange) filter, and reduce exposure two full stops

from normal. This will render a print with shadow detail reduced to a minimum and having an overall blue cast which has become acceptable as moonlight effect. Your players should be side-lighted, which you can do by using gold-leaf reflectors or incandescent light. This will photograph as white light and render better facial tones.

Another method is to use daylight-type color film as Type "A" film with the prescribed correction filter, and reduce exposure 1½ stops from normal. In such instances, silver foil instead of gold-leaf reflectors should be used to provide side-lighting, as described above.

To produce the day-for-night effect in black-and-white photography, a Wratten 25 deep red filter should be used for long shots, as it is the most effective for darkening the sky. However, it adds contrast, and faces will appear chalk white in closeups. Where proper rendering of faces is important, combine the Wratten 25A and 61 (light red and green) filters and figure the filter factor of the combination as 6 for your exposure. This will render a pleasing night effect, with the green filter enhancing skin texture.

Obviously, there can be no set formula for every filming problem of this type. For example, when shooting day-for-night in deep jungle with no sky visible, it would be unnecessary to use any filter—the recommended underexposure would suffice its open landscape, on the other hand, the overexposures above would apply. The key to good day-for-night results is underexposure, which removes shadow detail and darkens the whole scene for the illusion of night.

Q When shooting outdoors in sunlight and using an incident light meter, is the meter ever placed directly at the sun?—R.A.B.

Answer: When shooting outdoors in sunlight, the geometry of a scene may sometimes be such that a hemispherical meter used at subject location and pointed at the camera, might also be pointed at the sun at the same time. When a flat-cell incident light meter is used, the normal procedure is to point meter at the sun, since in this case the sun is the key light. ■

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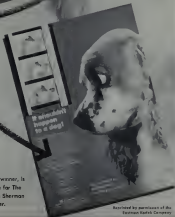
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FRID QADE (left), former head of Warner Bros. film laboratory and a veteran member of the American Society of Cinematographers accepts gold 25-year ASC membership card from Walter Munn, president of the Society.

ASC Gold Membership
Cards Presented

Twelve veteran members of the American Society of Cinematographers were honored with engraved gold 25-year ASC Membership Cards at the Society's February dinner-meeting. The presentation is an annual affair of the cameramen's society, which was founded January 8, 1919. The presentations were made by Walter Stronge, President of the Society.

In all, twelve cinematographers were presented cards — some in absentia: Louis A. Bonn (New York), Stanley Cortez, John P. Fulton, Fred W. Gage, John L. Herrmann, Emory Hase, Leo Lappe, Don Mulkarns, (New York), Joseph MacDonald, Hollis Mayne, Robert H. Plazek, and William A. Sickner.

Mergulian Elected to ASC

William Margulies, who currently is directing the photography of two television film series at MGM Studios ("Not For Hire" and "Philip Marlowe") was elected to Active Membership in The American Society of Cinematographers.

nephers at the Society's Board of Governors's meeting February 9.

Margulies became a director of photography about four years ago, after more than 30 years service in Hollywood studios as an assistant and operative cameraman.

Prior to entering the field of television film photography, Margulies had photographed a dozen feature films for Bel Air Productions, Hollywood. *



ABC PRESIDENT Walter Stange welcomes William Morgan to membership in the American Society of Chemoecologists.

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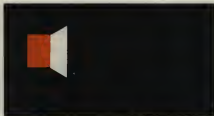
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PHOTOGRAPHIC ASSIGNMENTS

What the industry's cameramen were shooting last month

By MARION HUTCHINS

AMERICAN NATIONAL

MORRIS ARON, "The Men and the Challenge" (2½-TV) with George Nader, "The Man Dimension" (2½-TV) with Keith Andes.

RICHARD RIVKIND, "The Masterpiece" (2½-TV) with Gene Barry.

"AFC M. ROBERT 'Lucky' (2½-TV) with Macdonald Carey.

CURT FETTER, "Tombstone Territory" (2½-TV) with Pat Conway.

WILLIAM WHITLEY, ASC, "Men Into Space" (2½-TV) with Bill Lundgren.

CALIFORNIA STUDIOS

SQUIRE THOMPSON, ASC, "Have Gun, Will Travel" with Richard Boone and Kim Torg.

PETER SCHUCHT, "Gunslinger" with James Arness and Dennis Weaver.

PAUL BRITLEY, "The Legend" with Walter Anderson and Tom Tully.

CASCADE PICTURES

EDWARD BREMER, ASC, "Commercials"

WILLIAM SEALL, ASC, "Commercials"

COLUMBIA

JOE MACDONALD, ASC, "Type" (George Sobotky Int'l Post Trade, Commercial & Color) with Catherine, Dan Dailey and Shirley Jones. George Sidney, producer-director.

WALTER CASTLE, ASC, JOSEPH BRINK, ASC, BENNETT GUYER, ASC, WALTER SYRING, ASC, "Monsieur Gomez Threats" (Screen Gems).

BERRY FREELICK, ASC, "Dinner for Misses" (Screen Gems) with Gloria Henry and Herbert Anderson.

WALTER CASTLE, ASC, "Love of Mike" (Picture Screen Gems), Oscar Rudolph, director.

NIKE MURRAY, ASC, "233 Montgomery Street" (Picture Screen Gems, shooting in San Francisco), Paul Wendkos, director.

BENJAMIN LOPKIN, "Markham" (Screen Gems) with Vanja Jay and Patrick McVey, Fred Zinnman, director.

CHARLES WELSH, "Tightrope" (Screen Gems) with Michael Curran.

GERT ANDERSEN, ASC, "Dance Band Show" (Screen Gems) with Donna Reed, Oscar Rudolph, director.

FRED GATSON, ASC, "Father Knows Best" (Screen Gems) with Robert Young and Jane Wyatt, Peter Tewksbury, director.

PHILIP TANGHERA, ASC, "Man from Black Hawk" (Screen Gems) with Robert Redford.

BENNETT GUYER, ASC, "Reach for Tomorrow" with Burl Ives, Shelley Long and James Darren, Philip Leacock, director.

JOSEPH BRINK, ASC, "13 Ghosts" (William Castle Prod.) with Joe Morrow, William Castle, director.

DESIG STUDIOS—Culver City

LEON ARNOLD, ASC, "J. S. Marshall" (Dorla Trade) with John Randolph.

Continued on Page 194

"VFR" APPLICATIONS:



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WHY M-G-M CHOSE "CAMERA 65"

Following the trend to wider negative use, MGM's choice was the Panavision-engineered system that produces release prints of high resolution in any aspect ratio and film size.

By HERB A. LIGHTMAN

As *Metro-Goldwyn-Mayer's* super-spectacle, "Ben-Hur," thunders across the screens of the world, the credits reveal that this greatest of all film epics was photographed in "M-G-M Camera 65." Two questions naturally arise: "Exactly what is M-G-M Camera 65?" and "Why did Metro select this process in preference to all other available photographic processes as the system for shooting its most ambitious production?"

To answer the first question: M-G-M Camera 65 is an anamorphic system of cinematography in which the image is exposed on negative stock 65mm wide and printed on

FOR THE PHOTOGRAPHY of "Ben-Hur" in Rome, Metro-Goldwyn-Mayer studio provided director of photography Robert Surtees, A.S.C. (upper right in photo at left) with five M-G-M Camera 65's. Equipped by Panavision in co-operation with M-G-M engineers, the camera has 65mm negative, requires a massive blimp, and employs specially-designed lenses affording wide fields in resolution and color.

stock 70mm wide for projection on giant screens. It refers to a system designed and manufactured by Panavision, Inc., embodying several unique technical features.

To answer the second question, we must go back a few years to the time when M-G-M found itself appraising the shooting phase of "Ben-Hur." The studio wanted a photographic process of optimum quality to use in filming its epic production. Studio chiefs were dissatisfied with the technical quality of wide-screen systems then available. They especially deplored the curvatures and distortions inherent in these systems. They took their problem to a relatively new company, Panavision, Inc., of West Los Angeles, headed by Robert Gottschalk. Panavision was then engaged in filling an order to manufacture 15,000 pairs of anamorphic projection lenses to equip the theaters for the projection of pictures filmed in Cinemascope.

M-G-M, through its Chief of Research and Development, Douglas Shearer, asked Panavision to develop a 65mm wide-screen photographic system that would insure high-fidelity definition, remove the annoying curvatures and distortions of other wide-screen systems. In addition, the studio suggested the following series of qualifications that would make this in every way an all-purpose system:

(A) Enough information on the 65mm negative so that an excellent 3-strip Cinescans extraction could be made.

(B) A system that would permit a very high quality 35mm anamorphic print-down.

(C) The system must be capable of producing extremely high quality 70mm prints which could be projected with de-anamorphizing projection lenses to achieve an aspect ratio up to 3-to-1 without sound track and 2.7-to-1 with six-channel Stereophonic sound track on the release print.

(D) A system that would permit the extraction of a 1.85-to-1 non-anamorphic 35mm print, a 16mm anamorphic print, and a 16mm non-anamorphic print.

In other words, M-G-M wanted to be able to extract from one large key negative any type of release print it chose whenever the need arose for such a print.

With this in mind, and without any financial advance of any kind from M-G-M, Panavision set about on its own to design a series of taking lenses and allied equipment (including printer lenses) to produce a superior 70mm release print. As development of the equipment progressed a most harmonious relationship developed between Panavision and M-G-M. Studio executives Eddie Mannix and Douglas Shearer made available shooting facilities, camera crews and sound stages for the filming of tests—and all of the test footage was developed by the M-G-M lab. The equipment itself was designed and built exclusively by Panavision technicians headed by President Robert Gottschalk, Vice-President John Moore, and Walter Wallin, Panavision's chief optical engineer and mathematician.

All phases of the development and manufacture of the lenses (except the actual grinding) were done at the Panavision plant. Grinding of the elements was contracted out

to several glass grinding companies, but the lenses were assembled by Panavision.

The result was a series of taking and printing lenses of highest definition, and completely free of distortion. The unique process which makes this accomplishment possible is now used in the production of all Panavision optics. Though heavily protected by world-wide patents, many of the techniques and details, of course, are closely-guarded trade secrets.

When the equipment was completed, Panavision shot a test reel consisting of random scenes in San Francisco, Monterey and Death Valley. Projected for M-G-M executives, their response was highly enthusiastic and it was decided to use Ultra-Panavision (as the system is officially called) to photograph "Ben-Hur." The studio felt that it would be advantageous to give their use of the process a distinctive label, so they decided to call it: "M-G-M Camera 65."

Shooting schedule complications forced a one-year delay in the start of filming "Ben-Hur." In the meantime, the studio decided to use the new process in photographing "Raintree County." Panavision equipment was purchased by M-G-M and, with Robert Surtees, A.S.C., as Director of Photography on "Raintree County," Ultra-Panavision (or M-G-M Camera 65) was officially launched in the realm of feature film production.

M-G-M studio had planned to release "Raintree" in 70mm, but all 70mm projections then in existence were occupied with showings of the Todd-AO feature, "Around the World in 80 Days." M-G-M decided against manufacturing additional 70mm projections at that time, so "Raintree County" was released as a 35mm anamorphic print reduced from the 65mm original (which has a power of $1\frac{1}{2}$ anamorphic squeeze). Panavision built special lenses to make these "print-downs" and the resultant 35mm prints

Continued on Page 192



IT WAS DISTORTION such as this, caused by many anamorphic lenses, that urged MGM engineers in quest of better optics for filming, printing and projection of the studio's pictures.



PANAVISION LENSES and Camera 65 supplied the answer. Note the lack of horizontal distortion in subject's face in photo above, compared to subject's appearance in upper photo. Distortion also is greatly improved.

WHY EDGE-NUMBERING PAYS

Tiny numbers printed on edge of film cuts editing time by simplifying the matching of work print with original and sound track for quick, positive synchronization.

By HARRY TEITELSAUM



HOW EDGE-NUMBERING simplifies matching of picture with its sound track. The two films are locked in the synchronizer with the corresponding edge-numbers adjacent, as illustrated by film above photo.

Thereafter, the edge-numbers which are spaced every 12 inches and show the length of the film at any point, enable editor to quickly re-align picture and track following action of any take-up or access.

DIVIDENDS

EDGE-NUMBERING of processed motion picture film plays a most important role in simplifying editing techniques and assuring positive synchronization of the picture and sound tracks in the least amount of time.

In the beginning, and for many years after, in the motion picture industry, matching of the negative and positive was accomplished by matching the action. This method was slow at best, tedious and generally unreliable since it depended completely on the eyesight of the individual and this was, of course, hardly foolproof.

In the mid 1920's, Joe Aller of the Rothacker & Aller Laboratory in Hollywood, devised and patented a method of applying footage numbers on film with quick drying ink in a manner similar to the operation of a printing press. This technique was immediately successful for it proved to be a tremendous time saver and eliminated the possibility of human error.

When sound was introduced to the motion picture industry in 1928, it not only played an important role in the revitalization of motion pictures, but caused edge-numbering of film really to come into its own, since it provided a positive method of synchronizing the picture to the sound track in a practical and economical manner.

Today, all raw stock manufactured in this country carries a key number on one edge which can be used for identification. However, during the period when the editor is cutting the work print, these key numbers are no longer consecutive and it is to the film editor's advantage to apply his own edge-numbers in a consecutive order for simple filing and quick identification.

The film editor notes the edge-numbers of each scene of the cut dailies in a master log. Thus when editing of the entire film has been completed, the negative cutter is able to cut the negative picture and sound track to match the completed work print.

Edge-numbers are printed photographically on 35mm release prints so that film exchanges can order replacement sections of damaged prints by using the code numbers.

Edge numbering of motion picture film is accomplished by depositing ink from a fountain onto a rubber roller which is then applied to a revolving metal numbering block that prints the inked numbers in numerical sequence on the base side of the film at given intervals (every 16 frames or 1 ft. on 35mm and every 90 frames or 1 ft. on 16mm).

The numbering block usually consists of two letter wheels manually operated and four number wheels going from 0000 to 9999, which are mechanically operated. The numbers are applied to the base side of the film and printed photographically onto the dailies. By changing let-



THE HFC EDGE-NUMBERING machine which can print edge-numbers on motion picture film at speeds up to 120 feet per minute.

ters in numerical continuity, hundreds of thousands of feet of film can be thus coded.

Rapid-drying inks in black, red or yellow are used for edge numbering, and festooning rollers are used to lengthen the drying cycle, thus assuring that the ink will be dry before the film is taken up.

Black ink which is most difficult to eradicate is used when permanent numbering of the film is desired.

Red ink is most widely used on striped magnetic film since it lends itself to easy removal for magnetic film reclaiming.

Yellow ink is generally used for numbering 16mm color film since it is a color most easily read when applied on a black background.

Hollywood Film Company, Hollywood, manufactures a film edge-numbering machine that is widely used in the industry's studios and film laboratories. The HFC machine handles a maximum of 3,000-ft. of film on reels or flanges at one time and apply edge-numbers at a nominal rate of 100 ft. per minute.

When there is a black edge on 16mm film, which prevents printing edge-numbers photographically in the film printing process, the required edge-numbering can be performed on the HFC machine, which employs a direct-reading numbering block for this operation. In addition, the machine can be set to simultaneously apply synchronized numbering to both the original and the duplicate reversal print. Thus, when both films are placed in a synchronizer, the frames will match because the edge numbers will be adjacent.

Continued on Page 188





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COMING SUDDENLY when a dramatic and necessary shot, the worried cameraman hasn't time to check focus and lens stop before shooting. Working with the lens set for hyperfocal distance, he is secure in knowing that most of his shots will have acceptable sharp focus.

Sharp Focus Safety With Hyperfocal Distance

How to insure sharp focus
when shooting under pressure
with a hand-held camera.

By JOHN FORBES

When you're shooting under pressure, filming scenes of the "grab-it-quick" type, where you want to minimize fiddling with and thinking about basic camera mechanics, you can often set your lens at the hyperfocal distance and then forget focus, confident that (at least on most normal shots) everything important in your picture will be in adequately sharp focus. But to do this you've got to know what the hyperfocal distance is, and how to put it to work.

Hyperfocal distance is a double-action affair. First of all, it is the distance at and beyond which all objects are in focus when sharp focus is secured at infinity. But also—and perhaps more important—if you focus the lens at the hyperfocal distance, everything from one half that distance from the camera to infinity will be sharply defined. If, for instance, the hyperfocal distance is 25 feet, everything from that point on to infinity will be adequately sharp with the lens at infinity focus, while if the lens is set at the hyperfocal distance of 25 feet, everything from 12½ feet to infinity will be adequately sharp. The depth of field range is increased from 25 feet to infinity to 12½ feet to infinity.

The thing to remember at this point, also, is that depth of field increases—first, as the distance of the object from the lens increases; second, as the focal length of the lens decreases; and third, as the lens diaphragm is stopped down.

The hyperfocal point is dependent upon three factors: the focal length of the lens, the aperture used (expressed as an *f*-stop) and the circle of confusion.

The term "circle of confusion" refers to the diameter of the lens' image of any given point in the scene. Theoretically, if lenses could be made perfect, the image of a point would also be a point. But in practice, not even the finest of lenses can bring the images of all wave-lengths or colors of light to a focus so precisely in the same plane that the image of a point will be a true point. Instead, some wave-lengths will come to a focus on the plane of the film, while others will be focused microscopically behind or in front of it—in either case giving an image on the film slightly larger than the actual point. The practical result is that the image of the point is reproduced as a circle, rather than as a point. It is microscopically small, of course, but it is still mathematically measurable as a circle instead of a point.

The size of this circle of confusion therefore becomes one of the chief governing factors in the matter of image definition. Speaking generally, the finer a lens, the smaller the diameter of its circle of confusion. In the same way, if a lens is to be used for work that is not too exacting, hyperfocal and depth of field calculations can be based on a circle of confusion considerably larger than is necessary in a lens to be used for exacting work like cinematography. For still-camera work, for example, and even in some calculations for 35mm motion picture photography, a circle of confusion .002 inch in diameter may be quite acceptable; but for really professional 35mm cinematography, and for all 16mm cinematography (in which the relative enlargement in projection is much greater than in 35mm practice) the permissible circle of confusion must be taken as .001 inch.

It is easy enough to figure out the hyperfocal point for any lens and stop for yourself. The formula is:

$$H = \frac{f^2}{f \times C}$$

In other words, the hyperfocal distance (H) equals the

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CIGAR PLASTIC SHIELD mounted before camera offers a measure of protection for cameraman while photographing cougars at close range. Protective shield is designed for use with hand-held camera in such

situations as pictured above, which use of a telephoto-equipped camera at a safer distance is not feasible. Use of wing-nuts on bracket makes shield detachable.

Protective Shield For Wildlife Photographers

When you can't use a telephoto for wildlife closeups in the field, here's a gadget that makes it possible to work safely at close range of subject.

By ROY ZEPER

MOTION PICTURE PHOTOGRAPHY of wild life, especially reptiles, can be both difficult and dangerous, which is the reason that most cameramen in quest of such subjects invariably use telephoto lenses where closeup shots are desired. Use of tele lenses in such instances, however, presents some problems: the camera cannot be used successfully unless tripod-mounted; telephotos lack the required depth of field; and they produce the illusion of compressing the subject into the background plane.

A shorter or "normal" lens, on the other hand, enables the photographer to get good shots with the camera hand-held, and also permits following the subject in action with greater accuracy

than with a tripod-mounted camera. In addition, such shots have greater depth of field and more normal perspective.

Working in the field where there is considerable brush and undergrowth, the cameraman cannot easily spot his subject until suddenly coming upon him at close range. Such proximity to subject is often a proximity to danger, also, as when suddenly faced with a rattlesnake, or perhaps a cornered fox or coyote. Without protection of some kind, the average cameraman instinctively thinks of protecting himself, fails to bring his camera into play, and loses a rare and valuable shot.

Having experienced situations such



HERE, BOTH protective shield and remote-controlled camera are controlled for making closeups of animals at desired lens. Concealed shield offers protection to camera from startled animals that might otherwise upset equipment in sudden flight.

as this, I mounted a transparent plastic shield with an opening for the lens in front of my camera, as illustrated in photo at left. The shield is $\frac{3}{8}$ -in. in thickness and 16 inches square. The opening for the lens is 2-in. in diameter. The plastic panel is bolted to a right-angle bracket made of $\frac{1}{16}$ -in. steel. Bolts having wing nuts were used to permit quick mounting of panel in the field. A series of $\frac{3}{8}$ -in. holes are drilled in the base side of the bracket affording alternate positions for the camera, depending on the focal length lens used. When a telephoto lens is mounted on the camera, the latter must be mounted farther back from the protective panel.

This shield has on many occasions saved me from being clawed or bitten by wildlife subjects approached for closeups, and has deflected the venom of snakes and discouraged attack by brave but small animals which I have suddenly surprised in my camera forays. In addition, the shield also serves to camouflage the camera as well as myself when lying prone on the ground and working close to an animal lair, bird's nest, etc. In such instances, as accompanying photos show, camouflage is added to the panel in the form of a cloth or other material that blends with the surroundings.

Perhaps some observations on wildlife filming with this equipment may be timely at this point. The cameraman's greatest asset, of course, is knowing his subject and his habits. Forearmed with this knowledge, the cameraman knows where to search for his subjects with the greatest chances

Continued on Page 189



USING SHIELD with reflex camera, field permits cameraman to move scene while shooting, affords both protection and camouflage of the cameraman and his equipment when stalking nature subjects for extreme closeups.

Nominees Announced For Cinematography "Oscars"



"OSCAR"
Annual achievement award
of the Academy of Motion
Picture Arts and Sciences

TEN HOLLYWOOD directors of photography—all members of the American Society of Cinematographers—are contenders this year for the annual "Oscar" awards of the Academy of Motion Picture Arts and Sciences for the best cinematography of 1959. Their names and the titles of the nominated productions they photographed are as follows:

BLACK AND WHITE

- CHARLES LANG, JR., A.S.C.
"Some Like It Hot"
JOSEPH LAURENCE, A.S.C.
"Caddy"
SAM LEAVITT, A.S.C.
"Anatomy of a Murder"
WILLIAM WELLS, A.S.C.
"Daisy of Anne Frank"
HARRY STRANDBERG, JR., A.S.C.
"The Young Philadelphians"

COLOR

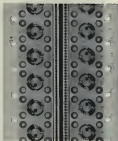
- DANIEL FAPP, A.S.C.
"The Five Pennies"
LEE GARMES, A.S.C.
"The Big Fisherman"
FRANK PLUMMER, A.S.C.
"The Nun's Story"
LEON CLARKE, A.S.C.
"Porgy and Bess"
ROBERT SURTESS, A.S.C.
"Bo-Ho"

All ten cinematographers have been nominees in previous years, and eight of them have won "Oscars."

Recounting the "Oscar" winning record of these men (in alphabetical order) we find that Lee Garmes won an "Oscar" in 1932 for "Shanghai Express"; Charles Lang, Jr., in 1933 for "A Farewell To Arms"; Joseph LaShelle, "Lure", 1944; Sam Leavitt, "The Defiant Ones," 1958; William Wells, "A Place In The Sun," 1951; Leon Shamroy, "The Black Swan," 1942; "Wilson," 1944; and "Leave Her To Heaven," 1945; Harry Strandberg, Sr., "The Picture of Dorian Gray," 1945; Robert Surtees, "King Solomon's Mines," 1950, and "The Bad and the Beautiful," 1952.

During the past ten years, nine of this year's contenders have had one or more pictures nominated for the Cinematography Award. Daniel Fapp's

Continued on Page 190



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PRINT DENSITY

Lip-Sync Sound With Any 16mm Camera

Magnasync's compact Nomad magnetic recorder makes any 16mm camera a sound camera. It's a "natural" for freelance television news cameramen, industrial film photographers and others engaged in the production of low-budget 16mm sound films.

By JOSEPH V. MASCELLI

THE MAGNASYNC "Nomad," a seven pound, ingeniously designed, completely transistorized magnetic sound recorder-reproducer offers a new approach to the truly portable lip-sync-sound recording problem. It pioneers the employment of split 16mm magnetic film, rather than tape, and provides for recording two separate sound tracks (one each for voice and music), which are automatically mixed when played back. This method eliminates the need for sound dubbing, and the duping of original film where a composite print must be made in order to combine picture and multiple sound tracks.

The Nomad makes any camera a sound camera, any projector a sound projector. While the Nomad unit was designed primarily for the advanced amateur and the semi-pro, it will be welcomed by the professional for filming those hard-to-get "impossible" sound shots that often crop up in the midst of a difficult production. It will undoubtedly appeal also to the free lance TV news cameraman, the industrial and in-plant cinematographers and others in the business of producing low-budget sound films.

Positive interlock is achieved in either filming or projection by means of a flexible cable. As may be seen in the photo illustrating this feature, there are two receptacles on the control side of the Nomad recorder—one marked 180 (the rpm speed of the 8-to-1 shaft of 16mm cameras) and 1440 (the rpm speed of the main drive shaft or threading knob of 16mm projectors). The flexible cable leading from the camera is plugged into the 180 rpm jack of the recorder, thus driving the recorder by means of the same spring motor that turns the camera. The 1440 plug-in is for use of the Nomad with a projector.

For shooting longer sound takes than the average spring-driven 16mm camera affords on a single winding of the

motor spring, an accessory D.C. electric motor can be attached to the Nomad to drive both the record and the camera. Whether the electric motor is used or the camera spring motor is employed to drive the equipment, the governor of the camera regulates the speed of both units. For projection and reproduction of sound with the Nomad, the unit is coupled with the projector by cable and it is the projector motor that drives both machines.

The basic seven-pound Nomad unit is mounted directly under the camera with a special bracket, and contains a complete two-channel recorder-reproducer with self-contained, transistorized audio and rechargeable nickel cadmium batteries. In use, track number one records voice. Later, music from a phonograph or tape recorder can be employed to supply a music track on the second sound channel. The operator can listen to the mixed voice and

Continued on Next Page



THE NOMAD recorder-reproducer is used with Belux 16mm camera. Unit mounts beneath camera and is interlocked with it by means of flexible cable so that camera drives the recorder. Here cameraman, wearing monitoring headphones, holds plug-in motor unit before him to check sound level on the VU meter as he shoots.



VIEW OF opposite side of Bolex camera showing flexible cable interlock (pinned) by which the camera drives the recorder

music tracks through earphones, which are part of the equipment, and adjust the record volume of each until the balance is pleasing. Because the music is recorded separately, the original voice track can not be erased or otherwise damaged. Recording is done by two individual heads resulting in two sound tracks 50-mil wide, which are separate and distinct. Reproduction, however, is by a single head which scans both tracks and mixes them automatically.

A remote hand mixer of unique design permits control of recording levels by a clever dish-shaped knob which fits the thumb. Thus the operator can "feel" the correct recording position while concentrating visually on the scene through the camera viewfinder. The mixer contains VU meter, record and playback controls, film-direct monitor switch (either direct or recorded sound may be monitored), battery test switch, microphone input, and earphone output jacks. The mixer may be clipped to the camera bracket or hung on the tripod or the cameraman's belt, or simply carried in his pocket during shooting.

The basic unit accommodates a hundred-foot roll of magnetic film to match the average 16mm camera's 100-ft. film load. For longer takes, and for projection-reproduction, a special bracket accommodating 400-ft. of magnetic film is available. Still another adapter allows use of 1200-ft. reels.

Magnasync engineers, after much testing and deliberation over a three-year period, chose to pioneer the use of split 16mm Mylar base magnetic film, rather than the conventional magnetic tape for two reasons: the split film width (8mm) allows ample space for recording two "clean" and separate sound tracks with sufficient space in between; also, the 3-mil-thick Mylar base has greater body and substance which makes it easily handled. Quarter-inch perforated tape was considered earlier, but was later abandoned because its 1½-mil thickness was considered too flimsy to provide the desired ruggedness and ease of handling inherent in the sturdier film.

The Nomad can be truly described as a single/double-system sound recorder—a term that would normally seem contradictory. It is single-system because sound and picture are integrated and handled as one. It is double-system since sound and picture are on separate films. It thus possesses single-system simplicity and double-system quality and versatility. Shooting sync-sound with the Nomad offers no more difficulty than might be encountered with any conventional single-system camera. The Nomad's better sound quality however, plus the ease of editing it affords easily places it on a par with the double-system method.

Now for a run-down of the various ways the Nomad can be used:

1. In its simplest form it will appeal to the amateur or the semi-pro as an interlocked sync-sound recorder, which can be driven by the camera's spring motor and used to record synchronized sound pictures anywhere without need for external power sources or cumbersome equipment. The camera can be handled as a single unit, even hand-held if necessary, and sound recorded almost effortlessly as scenes are shot. A music or sound effects track can be recorded later and mixed with the voice track. The corresponding picture film, together with its combination vacuo-music track can be reproduced, even with a silent projector (provided it can be operated at a steady 24 frames per second).

Continued on Page 182



REAGTE hand mixer controls VU meter, record and playback controls, film-direct monitor switch, battery test switch, mike input and earphone output jack, affording operator complete control of his sound takes



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Variable shutter permits smooth fades and lap dissolves. Greater exposure control possible through partial closing of the variable shutter instead of lens. Shows with **ISOFASES**—an optional accessory (\$37.50) that permits automatic operation of the variable shutter.

H-16 REX from \$400, with Lytar 1" f/1.8 lens.

BOLEX 16mm LENSES

Pos. Center 35—w/8.8" Flare 17.5 to 35mm—F22 \$426.50

Pos. Center 5/2.4 lens, focal lengths from 17.5mm to 35mm. \$323.50

Pos. Center 100 1/2.4 lens, focal lengths from 25mm to 100mm. \$326.50

Switar 12mm w/o 1/1.8 FM 8" to inf. "C" mount. Varioflex 1/4" to inf. "C" mount. \$349.50

Switar 16mm w/o 1/1.8 FM 8" to inf. "C" mount. Varioflex 1/4" to inf. "C" mount. \$386.50

Switar 25mm 1" 1/1.8 FM 1 1/2" to inf. Varioflex \$319.00

Yash 100mm 4" 1/3.5 tele. 4-power magnification. Focuses 8" to inf. \$388.50

Yash 16mm w/o 1/2.8 Focuses 1' to inf. "C" mount. Varioflex \$386.50

Switar 75mm 3 1/2" 1/1.8, focus 5' to inf. Varioflex, Constant, Yash and Reflex \$448.50

Yash 35mm 3 1/2" 1/2.8 tele. Focuses 5' to inf. "C" mount. Varioflex \$388.50

Switar 25mm 1" 1/1.8 Focuses 1 1/2' to inf. "C" mount. \$349.50

Switar 1/1.4 50mm 2" tele. lens. Ultra-high speed Focuses 3' to inf. \$448.50

Yash 150mm 6" 1/4 tele. lens. 7 1/2" length. FM 1 1/2" to inf. with case \$445.75

NEW ARRIFLEX 16



The only 16mm camera providing through-the-lens focusing and slow-drag during exposure, electric motor drive. Matte box cables. \$1725.00

16mm Xanon 5/1.9 lens. \$179.00

25mm Xanon 1/1.5 lens. \$179.00

25mm Xanon 1/2 lens. \$289.00

Pos. Center 75—zooms from 17.5mm to 75mm. \$269.00

Zoomer lens 1" to 3" 1/2.8 for Arriflex. \$579.00

Arriflex, Model 25 Tripod. \$175.00

Same as above plus built-in buckle switch and motor cable. \$1795.00

lock \$186.80

12mm Gingen F18 \$186.80



AURICON CINE-VOICE II

16mm sound-on-film movie camera with professional heavy-duty 3-lens turret. Operates from house current or car battery. Available in a choice of models to suit a variety of filming requirements. \$795.00

CINE VOICE I—Used \$495.00

AURICON PRO-600 — 16mm optical sound-on-film, self-blended, sync motor drive for single or double-system recording, electronic take-up, film-flow without friction (sketches or belts). Various combinations of accessories available. \$1494.25

ARRIFLEX "SUPER-1200" — 16mm sound-on-film camera (self-blended) with 3-lens turret for "C" mount lenses. 1200 ft. capacity for 20 minutes recording time. \$4149.00

SUPER 1200—AURICON-BILT professional hi-pack wgt. 27 lbs. \$498.25

AURICON PRO-300. New \$1,485.00 Used \$885.00



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BROOKS CAMERAS

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MULTIPLE CAMERA setup for scene for Jean Renoir's "Le Dejeuner sur l'Herbe." Note that the two Mitchell cameras at left are mounted on conventional studio-type pedestals—designed for location work. A third

Mitchell, in background, is set low to provide interesting camera angle for cutting. Separate microphones are installed at each camera position. Each camera shoots with a lens of different focal length.

Why Renoir Favors Multiple Camera, Long Sustained Take Technique

By JEAN BELANGER

FEW SCREEN DIRECTORS, perhaps, have so greatly influenced the cinematographic style of European film productions as has veteran Jean Renoir, whose most recent film "Le Dejeuner sur l'Herbe" ("The Picnic Party," by which title I shall refer to hereafter) reveals interesting innovations in use of the camera that undoubtedly stem from Renoir's recent excursions into program production for French television.

The more important of these innovations is best described as the not unfamiliar technique of employing several cameras operating simultaneously to record long sustained action and dialogue of players, as in TV. Renoir

believes an actor is better able to develop a feel for his role and give a better reading when the action is not broken up into short takes for the sake of varying the camera angle or point of view. Using the sustained take technique, the action is photographed by several cameras, each shooting from a slightly different angle and with lenses of different focal lengths. This affords greater latitude for the director and the actor to develop pace and build up suspense through the variety of "points of view" this method affords for each take.

In "The Picnic Party" Renoir has perfected the methods he had employed earlier in his production "Le Testament

du Dr. Cordelier" ("Dr. Cordelier's Wife"), which was made for both theaters and French television.

Renoir's director of photography for both pictures was Georges Leclerc, who has several feature films and a number of short subjects to his credit, and who also was my cameraman on the production "Take On Tires," a short subject about the Paris subway produced in 1957. (See "Subway Filming Poses Problems In Lighting and Photography," *American Cinematographer*, December, 1957.) More recently, Leclerc has been lighting programs for French TV.

The multiple camera technique was used most ambitiously by Renoir in filming "Le Testament du Dr. Cordelier." Here several cameras were employed running continuously, or starting one after the other on cue as an actor progressed with a lengthy scene—in when exiting from a room, then proceeding along a passage, down a stair, etc.—with each of the carefully placed cameras picking him up as he comes into view. This was a film with few actors, made in black-and-white, and in the conventional screen format.

"The Picnic Party"—a comedy about a famous biologist whose pretheoretical doctrines are deflated by the love of a simple peasant girl—has a large cast, three-fourths of its scenes are natural exteriors, is in Eastman Color and 1-66-to-1 aspect ratio, and was photographed with the multiple camera technique.

Mitchell cameras were chosen, not only because of their ruggedness and reliability, but because of the accuracy with which their lenses are mounted. The latter was a most important consideration because it insured smooth intercutting of negatives from all Mitchell cameras used in the multiple camera set-up.

Still another factor which favored the Mitchell's was the fact there is no glass in the camera's main box which, as Leclerc pointed out, insured none of the differently positioned cameras would be bothered by glare and reflection when panning on a scene, regardless of position of the sun. This is a vexing problem with some European cameras.

In all, cinematographer Leclerc had at his disposal for

this production a total of four Mitchells and one Caméflex—the versatile 400-foot-magazine-equipped French camera known in the U.S. as the Camecine. The latter was sometimes used with a blimp, thus providing a fifth sound camera when necessary. But its greatest value was as a portable, hand-held camera for making roving shots.

Leclerc's camera crew numbered twelve in all: an operating cameraman and an assistant on each of the Mitchells; one cameraman for the Caméflex; plus two general assistants, one in charge of color problems and the other in charge of loading and care of the film magazines.

Renoir had chosen the 1-66-to-1 aspect ratio instead of the CinemaScope format because, if he likes to place his actors in groups, he does not want them too far apart. The 1-66-to-1 format also enabled Leclerc to use longer focal length lenses, which enabled him to underscore foreground and sky areas in scenes—factors which played no part in the human comedy aspects of the story Renoir was most interested in. Moreover, Renoir explained, the longer lenses made the actors more "present" on the screen. In this respect, TV imperatives and his own tastes were in agreement.

Before actual shooting of the picture was begun, Renoir journeyed to the location where most of the action was to be filmed—les Calettes, the old country house of his father, Auguste Renoir, famous French impressionist painter. It stands near Cannes, a picturesque village on the French Riviera. To facilitate construction at the studio of the necessary interior sets, accurate measurements were taken of the rooms of the historic country house. While set construction progressed, extensive rehearsals were conducted involving all technicians, cameras, lighting and sound equipment, as well as the actors. All this was important, of course, in order to insure the flawless performance and the technical excellence of the photography in filming the action is sustained, unbroken continuity using several cameras as previously described.

Nearly four-fifths of this 100-minute production was shot at, or near, les Calettes. The weather was generally

Continued on Page 186



HERE A SINGLE Mitchell camera mounted on a set-on-wheels pedestal is used to film a scene for record picture directed by Renoir, united for right. A single, motion-panned lens is used as a monitor.



CINEMATOGRAPHER Georges Leclerc, right, discusses upcoming camera work with Renoir on Picnic studio sound stage. Renoir's long-time technique stems from his recent experience in French TV production.

How To Get Professional Results With Reflected Light

Position of the sun and deep shadows are never problems when reflectors are intelligently used.



HOLLYWOOD cinematographers invariably use reflectors when shooting exteriors of great scope—particularly at times of day when the sun has moved toward its where it would otherwise create unwanted shadows. Here two booster lights are also used because of their ability to penetrate farther than sunlight reflectors.

THE POOL-COVERED sunlight reflector developed by Hollywood studio cameramen many years ago, is today a "must" item of equipment for any professional cinematographer. Its purpose is to augment the sun in outdoor filming by providing fill or booster light—to smooth out shadows or eliminate them entirely.

Because most film makers, excepting the major studios, do not have the conventional high-powered booster lights nor the mobile generator plants to power them, the sunlight reflector has proved of tremendous worth as an adjunct to illumination when shooting on location. Today, there are few industrial, business or in-plant film production units that do not use reflectors almost daily.

Sooner or later, every professional films cameraman



INDUSTRIAL AND in-plant film units, many of which are without booster light equipment, can use sunlight reflectors in great measure. Here, a reflector, set high, provides fill light for a scene for a public relations film produced by the motion picture department of Northrop Aircraft Company, Los Angeles.

adopts the use of reflectors for shooting scenes out of doors in sunlight. And he should, if he aims to achieve the photographic quality of the professional in his work. For there is no surer sign of neophyte photography than shots of people made out of doors with heavy shadows obscuring facial features. Or of scenes shot in color in shade where the color is greatly degraded because light was insufficient and heavy shadows predominated.

Perhaps the reason more lesser cameramen fail to employ reflectors is because they are not generally far sale as standard photographic equipment in camera stores. But this need not deter the really serious cameraman, for he can easily construct his own. Basically, a reflector is a panel of rigid material, such as plywood, wallboard, etc., coated with a highly reflective material such as aluminum foil, aluminum paint, flat white paint, etc. Its purpose is to reflect sunlight, and it should do this in a semi-diffused manner and without creating "hot" spots.

Many cameramen start with nothing more than a sheet of white cardboard, perhaps for reflecting light into a subject's face for a closeup. The next step is to paint one side of a large panel of cardboard with aluminum paint. Then, once results are noted on the screen, reflectors become a must for all future outdoor photography. It generally follows that the photographer acquires or makes a number of durable reflectors, compact in size and easily carried along with camera and tripod.

Professional reflectors, such as used in Hollywood studios, vary both in size and in reflective material. Many of the studios have a range of reflectors, each with surfaces of different reflective intensities. Still others have dual reflectors having both surfaces coated—one bright, the other soft. The brighter the surface, the stronger and harder the reflected light. These are employed where the light must be reflected a considerable distance. Reflectors of this type

Continued on Page 172

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tripod, belt or pocket during takes.

7 lb. recorder/reproducer

The amazing Nomad makes
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sound camera, any projector
a sound projector
in professional "lip sync"



A. Nomad film is split 16mm. Channel #1
on the two-track record head is used for lip-
sync, and narrative recording on location.
Later, complementary music from phonograph
or tape recorder is "dubbed" on channel #2.
Simultaneous playback thru the full width
play head mixes music and voice, producing
theatrical-quality sound.

B. For lengthy sequences, a regular camera
D.S. meter can be attached to the Nomad,
driving both recorder and camera thru the

flexible cable. There is a 144 rpm output
on the Nomad camera interlock and a 1440
rpm output for projector interlock. Playback
can be double-system, or a U.I. interlocked
transfer from recorder to a strobed release
print can be made with a magnetic sound
projector.

C. Basic film capacity is 150 ft., the use of
simple adapters can increase capacity to 400
ft. or 1200 ft. Entire Nomad system fits con-
veniently into small carrying case.

Filming is easy with an inexpensive synchro-
nizer and a sound reader. Since each roll of
Nomad film is exactly the same length as the
picture film, points of reference for editing
are easily provided.

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Basic Nomad system consists of recorder/repro-
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REAR VIEW of the Auricon Super-1200 camera, showing convenient location of controls and the focusing and Telefinder eyepiece.



FRONT VIEW, showing the 3-lens turret which takes all "C" mount lenses, including telephotos up to 12 1/2 in. f/1 and zoom lenses.

Motion Picture Cameras

PART VIII

THE AURICON SUPER-1200

The big "Pro" of Auricon single-system sound cameras boasts many noteworthy features.

THE LATEST Auricon Super-1200 16mm sound-on-film camera built by Bach Auricon, Inc., Hollywood, incorporates many new and significant design features especially engineered to aid the professional 16mm cinematographer in producing high quality sound motion pictures. The camera is unique in that it features three separate finder systems that provide every operating convenience in securing in-focus pictures with positive field area coverage.

Finder No. 1 is an instant ground-glass focusing reflex finder, with 10X focusing telescope, which allows the cameraman to view the scene through

the camera-lens for picture composition and focus. The camera's "leather-touch" focusing system can be operated with one finger. Because the camera body, lens turret and film-gate are not shifted during focusing, nothing moves except a miniature precision prism-reflector system inside the camera, between the film-gate and the camera lens. (See diagrams.) This means that when working with the camera tripod on soft ground (especially when using long-range telephoto lenses) there is no danger of disturbing the picture composition by inadvertently moving the camera position while shifting from "focus" to

"shooting."

It is also possible to use the reflex system while the camera is running, to check for camera and projector shutter synchronization when shooting background-projection scenes; also for kineoscope recording, and for special-effects work. As a safety feature, the camera cannot be started if the reflex-focusing system is in focusing position. This feature prevents film from being run through the camera which would not be exposed if the reflex focusing system was in the focusing position.

Finder No. 2 is a special telephoto-type which employs a set of miniature

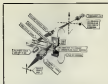
tele-objective lenses, mounted in the lens turret, adjacent to the "C" mount lenses. Each of the three taking lenses are matched with miniature tele-objective lenses of the same focal length. The 36X focusing telescope, which is used with the ground-glass reflex focusing finder, is also employed as part of the optical system for this telephoto-lens-finder, so that when photographing sporting events or whenever telephoto lenses are used, the finder always shows a brilliant, upright and enlarged picture corresponding to the image being photographed. The "frather-look" control bar of the finder optical system is engraved to designate whether the ground-glass focusing system or the tele-finder optical system is in viewing position. Telephoto lenses up to 12 inches focal length can be used in conjunction with the camera's telephoto finder system, thus providing a convenience never before available to the 16mm cameraman. If desired, shorter focal length lenses down to the 10mm wide-angle can also be used for which there is a corresponding tele-finder objective.

Finder No 3 is the conventional studio-type and provides a large, brilliant ground-glass image, upright and correct right to left. As this finder is focused, automatic adjustment for parallax is accomplished. This patented auto-parallax studio type view finder provides an image which can be viewed easily with both eyes from any position behind the camera.

The turn-of-the-barrel turret on the Super-1200 camera is stiffly designed and accepts all "C" mount 16mm lenses, including telephotos up to 12-inches in focal length. Zoom lenses may also be used. The turret also incorporates three unique turret locking knobs which permit the turret to be rotated without touching the camera taking lenses or disturbing their focus and diaphragm settings.

Interchangeable camera doors permit the cameraman to quickly interchange a finder-mounted camera door with a plain door, when a Zoom-Lens with coupled Viewfinder is to be used.

Still another unique feature of the Auricon Super-1200 camera is its completely quiet operation. The Cassette is self-blipped and truly noiseless, and there are indicator lights mounted in the front and rear of the camera body that flash on automatically when the camera is running. The blipping hood, which is adapted to the front



IN FOCUSING POSITION: A fan beam, enlarged ground-glass image is seen by the examiner, he reads the focusing



IN SHOOTING POSITION: Ground glass forming screen has been shifted to left, permitting image to reach the film.

of the camera body with support rods, may be quickly removed when long focal length lenses or a Zoom lens are to be used. The support rods may be readily removed when complete freedom around the three-lens turret is desired.

Additional neon signal lights are located on the rear panel of the camera to indicate when the power is on, thus preventing accidental disconnection of power to the camera without knowledge of the operator, and to indicate whether the camera heater is in operation. A new feature recently added to the Super-1200 camera is a 115-volt AC line-voltage indicator meter. This is located at the rear of the camera on the Electro-

matic take-up assembly housing, and enables the cameraman to check the line-voltage before and during operation of the camera to assure that proper current is available for driving the camera mechanism at the desired speed. The new thermostatically-controlled camera heater, a feature recently incorporated in the camera coverplate, assures reliable performance of the camera under cold weather conditions.

The Super-1200 is powered with a high-torque, synchronous motor having adequate power to drive the drums even in colder low temperatures. This motor, which is standard equipment, has proven ideal for open

Continued on Next Page



CLOSEUP VIEW of turret shows matched tie-binder beams positioned on turret adjacent to corresponding tieing beam.

AURICON SUPER-1200

Continued From Preceding Page

ating the Super-1200 for single-system sound film production or for straight photography in conjunction with double-system sound recording equipment. A 115-watt, 50-cycle A.C. synchronous motor is available for operating the Super-1200 at 24 fps.

An illuminated Veeblee-Roof footage and frame counter is located on the rear control panel of the camera. On special order, the Auricon variable-shutter can be incorporated in the camera for making fades, or for adjusting the camera exposure at any desired point from 1/50th to 1/200th of a second. The shutter can be locked in any of four exposure positions, and also in the closed position when desired.

Both 1200- and 600-foot capacity magazines are available with the new Super-1200 camera. The 1200-foot magazine features a rotating internal flange on the take-up side to further assure smooth take-up of film during long periods of continuous sound-on-film shooting. The 1200-foot magazines are ideal for shooting half-hour television programs or for video-film (kinescope) recording when the camera is adapted with the Auricon TV-T Shutter. The 600-foot magazine provides up to 16 minutes of continuous sound-on-film recording. A continuous, "Electro-matic" take-up system is provided on standard equipment and employs a Neoprene rubber take-up belt.

The intermittent film movement of the Super-1200 camera is precision-ground of hardened steel. The pull-down claw enters the film slowly at the start of each 1/50th of a second pull-down cycle, increases in speed during the center of the cycle and then slows down to a gentle stop before lifting out of the film perforation to produce rock-steady images on the film.

The film moves through the gate over jewel-hard sapphire surfaces which provide perfect focus registration by positioning the film emulsion exactly .090 of an inch behind the "C" mount lens. The Auricon camera gate design (covered by U.S. Patent No. 2,506,765) eliminates the usual emulsion pull-up troubles even when 1200 feet of film are run continuously through the camera without a stop.

The Auricon Super-1200 camera is

also a high-fidelity sound-on-film recorder. The film-moving mechanism for recording sound on the same film as the picture is triple-filtered for smooth film flow. The camera is usually furnished for variable-area sound-track recording with shutter noise-reduction. This type sound track is of the highest fidelity, yet minimizes Eberhard effect and blackie line troubles, which often occur on multiplex-track recordings, and is said to provide the best results with average day-to-day film-laboratory processing.

The Super-1200 Camera is also available with variable-density noiseless recording, if desired. Both variable-area or variable-density Auricon sound-on-film recording galvanometer systems have proven rugged and dependable and are unconditionally guaranteed for two years. The Auricon galvanometer and optical system is rugged enough to easily withstand the recording of gun-fire, yet can capture the delicate shadings of a fine symphony orchestra on the sound-track. No adjustments are required or provided for on the galvanometers.

A new feature of current models of

the Super-1200 Camera is the head-phone monitoring jack in the camera body, which permits the cameraman to plug in earphones and monitor the sound being recorded without affecting his ability to properly operate the camera during a take.

The Auricon Filmagnetic recording equipment may be installed on special order in the Super-1200 camera for magnetic recording of music and speech on sound-stripped film. It is available as accessory equipment, as is other Auricon Recording Equipment.

Few professional format sound-on-film cameras display the advanced engineering that is exemplified in the many exclusive features described above for the Auricon Super-1200. With its convenience of multiple film, 1200-foot film capacity, the exclusive alternative feature of magnetic recording on pre-stripped film, and its trouble-free film gate with sapphire-studded track that insures unusually steady film flow—to name but a few of its salient features—the Auricon Super-1200 commands an important position among the world's finest motion picture cameras. ■

SHARP FOCUS SAFETY WITH HYPERFOCAL DISTANCE

Continued From Page 168

focal length of the lens (F) multiplied by itself and divided by the product of multiplying the f-stop (f) by the circle of confusion (C). You can see that for any one lens, two of these factors—focal length (F) and circle of confusion (C)—remain constant. The other two may vary, and therefore influence each other.

Now let's see how this works out in practice. Suppose we have a 2-inch lens

and set it at $f/2.5$. Assuming the circle of confusion to be .001 inch and substituting these numerical values in our formula, we have "H" equal to 2×2 divided by $2.5 \times .001$. This works down to 4 divided by .0025, and gives us 1600 inches or 133 feet. If the lens is focused at the 133-foot point, everything from a point about 65 feet from the lens to infinity will be sharp.

Now, if we stop the same lens down

HYPERFOCAL DISTANCES

Focal Length (Inches)	Focal Ratio (Stop Number)											
	f1	f1.5	f2	f2.5	f3	f3.5	f4.5	f5.6	f8	f11	f16	f22
1	83	56	42	33	28	24	19	15	10	8	5	4
1½	125	83	62	50	42	36	28	22	16	11	8	6
2	167	110	83	67	56	48	37	30	22	15	11	8
2½	210	140	110	93	68	60	46	37	26	19	13	10
3	—	173	125	100	83	71	56	45	31	23	16	11
3½	—	200	150	120	100	83	65	52	37	27	18	13
4	—	—	170	130	110	95	74	60	42	30	21	15
4½	—	—	190	150	125	110	83	67	47	34	26	17
5	—	—	—	170	140	120	95	74	52	38	26	19
5½	—	—	—	185	150	130	100	82	57	42	29	21
6	—	—	—	200	165	145	110	89	63	46	31	23
6½	—	—	—	215	180	155	120	97	68	49	34	25
7	—	—	—	235	195	165	130	105	73	53	37	27
8	—	—	—	—	—	190	150	120	83	64	42	30

Calculated for a disc of confusion equal to the focal length of lens

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use at the right time to the
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to $f/11$, this will give us $2x2$ divided by $18 \times .001$, which evolves to 4 divided by .011 and in turn works out to a hyperfocal distance of 363 inches or 30 feet. At this setting, everything from 15 feet to infinity will be adequately focused.

For contrast, let us consider a very short-focus lens, like the 125mm lenses used on 8mm cameras. Working it wide open at $f/1.9$, the formula would figure out as 5×5 divided by $1.9 \times .001$, which comes down to 25 divided by .0019, and gives us 131 inches or 10.9 feet as the hyperfocal distance for this lens at this wide-open aperture. Using the same figures for the same lens stopped down to $f/11$, we find the hyperfocal distance in this case has moved up to 134 feet from the camera. No wonder it is possible to get such remarkable results with fixed-focus 8mm cine cameras!

There are times when the cinematographer may wish to obtain adequate focus on some secondary object or person nearer the camera than either the principal subject or the hyperfocal point. Or he may wish to let the far limit of good focus fall short of infinity, to eliminate a distracting background. In this case it will be useful to know something about depth of field, and how to make it work to his advantage. Technically, depth of field means the distance between the nearest and farthest objects in acceptably sharp focus.

If you're mathematically minded, you can determine these two points by the following formulae:

$$\begin{aligned} \text{Near} &= \frac{D \times H}{H + D} \\ \text{Far} &= \frac{D \times H}{H - D} \end{aligned}$$

In each case, D represents the distance from camera to object, and H represents the hyperfocal distance under the particular conditions of stop, focal length and circle of confusion applying to that particular shot.

To illustrate this, suppose we use the 2-inch lens we've been talking about at its maximum aperture of $f/2.5$. Earlier, we determined the hyperfocal distance for it—133 feet. Assuming our object is 40 feet from the camera, we get this equation:

$$\begin{aligned} \text{Near} &= \frac{40 \times 133}{133 + 40} \end{aligned}$$

This equals 5320 divided by 173, and gives us approximately 30 feet as

our near limit of good focus by applying the second formula, which works out as 4×133 divided by $133 - 40$, or 5320 divided by 93, which gives us 57 feet as the far limit of good focus.

Since the hyperfocal distance is a basic factor in these calculations, and it, in turn, varies according to the focal length of the lens and the stop being used, a little work with pencil and paper will show just how and why the depth of field increases as the focal length decreases or smaller stops are used, and why with longer-focus lenses, or larger apertures, the depth decreases.

An understanding of these two simple optical factors—the hyperfocal distance and depth of field—can go a long way toward simplifying focusing problems for the cinematographer who works a great deal in the field with a hand-held camera and without benefit of ground-glass focusing. As stated earlier, once you know how to put the hyperfocal distance to work for you, you will know how, and to just what extent you can make any lens serve in an emergency as a fixed-focus, though not always universal-focus, lens.

And when you have familiarized yourself with the depth of field characteristics of your lens, you'll find you can make this factor work for you in two ways. When you want "pan-focus" or extreme-depth effects, you can get them by using a short-focus lens well stopped down.

And when—as in making closeups—you want to focus selectively, so that your picture will concentrate attention on the subject without intrusion from either the background or the foreground, you can do this by using longer-focus lenses and larger openings.

Neither a hyperfocal setting nor reliance on depth of field can ever altogether take the place of precise focusing on the subject. But they can come in mighty handy in emergencies!

Two simple rules that can be followed with good success by field cinematographers, TV news photographers, and others who work mostly with light, hand-held cameras are as follows:

1) When the background is not too distant, focus on a point or object equal to twice the product of the greatest and shortest distances, divided by the total. With the far object, say, at 60 feet and the near object at 15 feet from the camera, working it out mathematically as follows, we arrive at 24 feet—the distance to be focused on.

$$\frac{2(60 \times 15)}{60 \times 15} = 24$$

2) When the subject is comparatively near and the background is extremely distant or at infinity, focus on a point twice the distance of the nearest subject.

A table of hyperfocal distances, of course, is always a handy thing to have for ready reference, and will give you quick answers to focusing problems without having to work them out mathematically. However, it sometimes happens that a cameraman will be caught on an assignment without a handbook of tables or a Hyperfocal Distance reference chart; it is then that knowledge of the mathematical formulas will come in handy.

(The A.S.C. Photographic Manual, now in preparation, will include charts on hyperfocal distance and depth of field—ED.)

LIP-SYNC SOUND

Continued from Page 174

as a finished sync-sound picture. No dubbing, dipping, or composite printing is necessary.

2. For more ambitious sound film production, a D.C. camera motor can be employed to drive the camera-recorder combination, so that film loads up to 400-feet in length can be used Extension arms providing for use of 400-foot reels of sound film with the Nomad recorder are available. The combined unit still remains highly portable since only the larger reels and brackets, the D.C. motor, and battery for same are added. No inverter or power pack is necessary.

3. The Nomad may be converted to a compact, miniaturized, studio or location type double-system recorder with the addition of a synchronous motor, such as the Bodine K, plus either the 400-ft. or the 1200-ft. reel adaptor, and a torque motor for take-up. The entire outfit fits in a small case, weighs only 12 pounds and requires only 50 watts to power the sync motor. A transistorized 100-watt inverter should be sufficient to run the recorder and almost any 16mm motor-driven camera for location shooting.

Now let's look at the various ways the original sound film may be used:

1. In its simplest form it may be edited side-by-side, since it is shot 1-for-1, and projected interlocked to



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furnish a combination video-audio track for the original film.

2. The edited sound track may be run interlocked with a magnetic sound projector and the combination sound track transferred to the original film, after a magnetic stripe has been applied. The magnetic-striped film may then be projected on any magnetic sound projector.

3. The dual sound tracks may be transferred by re-recording to full 16mm optical or magnetic film, used alone or dubbed with other tracks, or combined into a composite sound picture possessing either magnetic strips or optical track.

The simplicity and versatility of the Nomad will appeal to all 16mm cameramen—from the amateur to the professional in need of ultra-portable sync sound equipment. The unit will be attractive to the amateur on a price and simplicity-of-operation basis, with no need to dupe the film in order to obtain a sound picture with voice and action. The pro, on the other hand, will find the Nomad the answer to those problem sound shots, that require the utmost in portability, weight and size for tough location assignments. Transferring the track to full 16mm magnetic film will also make it compatible with standard tracks and allow its use interchangeably for dubbing and composite printing. Expansion of the basic unit, rather than the need for several different models, also allows the Nomad to be used with a wide range of 16mm cameras from a simple 100-ft. spring-wind job to a 1200-ft. double-system synchronous recorder. It can provide an excellent second recording unit for emergency use in tough situations because of its portability, adaptability and versatility in both shooting and editing.

Editing is easily accomplished with a simple, inexpensive synchronizer and sound reader. Editing picture and sound side-by-side often no problem, since as long as equal portions of both films are removed, picture and sound will always remain in sync.

Simple dubbers (or dummies) consisting of the film transport unit and the playback amplifier will soon be available from the manufacturer that can be used in series for re-recording of multiple tracks.

For the amateur, camera noise need not be a serious problem since using a directional microphone will record no higher noise level than that given out by the projector. For the discerning

semi-pro, or the professional, camera "burners," available for most makes of 16mm cameras, can solve the camera noise problem.

Since the Nomad provides for recording on two tracks its future use as a stereo sound unit naturally suggests itself. The hand trigger is also designed with future expansion in mind: its side components are separately direct-cut pieces (rather than a single overall casting) so that its function and range can be expanded for future needs.

Magnasync, with over ten years' experience in the magnetic sound recording equipment business, and with over 5,000 standard professional recorders in professional use throughout the world, have combined all of their experience, know-how and engineering skill into development of the Nomad. This recorder should fill a definite niche of its own in motion pictures' many fields, both amateur and professional. Advent of the Nomad recorder presents an exciting break-through in sync-sound film recording that should open up vast vistas, not only for the serious amateur, but for industrial, educational and television film producers everywhere.

RENOIR—MULTIPLE CAMERA

Continued From Page 177

good. However, because the location was close to the Mediterranean, distant backgrounds in long-shots were marked by haze. The beautiful trees and meadows surrounding the old country house enhanced the pastoral effect as desirable for the exterior action of the picture. To achieve the light colors and soft photography which Renoir felt these scenes demanded, Leclerc consistently used 85/83 and 85/86 filters on his camera lenses so that in the bright Riviera sun he could work at stops of $f/3.5$ or $f/3.2$.

Comparatively few booster lights were used—just one 225-wsp. and three 150-wsp. lamps were brought to the location along with two small projectors. The sound engineer (De Bretagne) mounted a separate mixer at each camera location so that he often had as many as five channels to take care of at one time. The electricians worked in two crews—one setting up the lights in advance and the other working during the filming.

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Paris studio interiors, was shut in three weeks, it was not for financial reasons that Renais chose the methods that he did and which resulted in completing the picture in such a short period of time. To him the actors are all-important, and by filming action in long, sustained takes he was able to obtain from his cast performances having more human warmth and spontaneity than when the conventional "short-take" method is employed.

There were some exceptions, of course: in one scene in which an old shepherd produces a momentary hurricane simply by sounding a few notes on his flute, the noise made by the wind machines made silent filming imperative, and the required sound was dubbed in later—something that Renais, a stickler for authenticity in scenes and scenes, hates.

There were problems in makeup, too. Most of the actors were sensitive to the sun and as days went on, their skins became more sunburned. This required a very careful check of the principal players each day by cine-

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matographer Ledere so that there would be no visible change in the color tones of faces from day to day—a matter that was remedied by progressively changing the type of makeup applied daily to these players.

What made the problem of face lighting more intricate, Ledere explained, was that much of the exterior

action was played under or near trees in which the actors invariably moved from shade to sunshine or vice versa. Also, with continuous filming of scenes with five different cameras at various positions, the players sometimes did not face the camera. Here, cinematographer Ledere's wide experience in photographing documentary films

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Following completion of "The Picnic Party," director-playwright Jean Renoir returned to the United States and last month was appointed a Regent's Professor of English and Dramatic Arts at the University of California, Berkeley, California.

He will serve on the Berkeley campus during the current Spring Semester, which runs from February 1 to June 9. It is tentatively scheduled that Renoir will collaborate with the students and faculty of the Dramatic Art department in the production of plays, participate in a film festival, and probably deliver a limited number of public lectures on problems of the theatre and the cinema.—ED

shared Renoir's preferences. In documentary films, Lockie explained, the people on the screen appear working or enjoying themselves without troubling to be "correctly" positioned for the cameras. It is this style that marks the photography of "The Picnic Party," and which, according to Renoir, enhances the impression of realism—"makes you look into the real world of people who are concerned with their own lives, not into the world of actors playing to the theatre audience."

An interesting footnote to this account of the photography of "The Picnic Party" is the fact that nearly every scene was done in a single take—eloquent testimony of what can be accomplished when a director with ideas and an imaginative cinematographer work harmoniously together to weld the dramatic with the pictorial for an outstanding screen result.

EDGE-NUMBERING

Continued From Page 185

Synchronizing edge-numbered picture film and sound track is relatively simple. A sync mark is made at the beginning of each film 12 inches ahead of the frame scheduled to receive the first edge-number. This frame is placed onto the drive sprocket directly over the marked sprocket area and locked into its position. The first number on the edge of the film will then appear exactly one foot from the sync mark.

and subsequent numbers every 12 inches thereafter.

Many film makers today are shooting 16mm pictures and using 35mm film for sound and work prints—a procedure that makes edge-numbering imperative in order to accurately match the 16mm footage with the 35mm in editing.

Hollywood Film Company was the first to produce a film numbering machine that would edge-number 16mm film every 16 frames to match 35mm, using a single numbering block. In addition, the company has designed and manufactured machines to edge-number VistaVision, 55mm and 65/70mm film to facilitate matching them with 35mm film for editing and cutting.

When one considers the saving of time and the positive assurance of perfect synchronization of pictures and track that edge-numbering affords, it is obvious that edge-numbering pays substantial dividends in economy for film producers.

PROTECTIVE SHIELD

Continued From Page 171

of finding them, and what to expect when coming upon them. In stalking a subject, it is important to know the characteristics that are common to wildlife in general.

All animals, except the monkey tribe, are color blind. They are, on the other hand, extremely perceptive as to movement to which they react in three basic ways: turn tail and flee; "freeze" in their tracks and depend on their natural camouflage to protect them; or attack the intruder, as for instance, the rattler. Each has its own reaction pattern, and none can be considered dependable or consistent. A great deal depends upon the individual animal—in its age, proximity of the mating season, degree of hunger, and circumstances under which it is encountered by the camera-man.

Wildlife generally depends on sharp olfactory senses and keen hearing for protection. Thus, a cameraman should always approach a subject walking into the wind to lessen the chances of the animal or bird sensing his approach. When shooting pictures in one area over a long period of time, it should be kept in mind that most

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to insure entry of some in the "Oscar" derby, place the names of such films at the top of their preliminary ballot.

The twenty productions receiving the greatest number of votes from the preliminary balloting are then screened at the Academy's theatre to give all members of the Cinematographers Branch an opportunity to see them under the same conditions.

Following the screenings, a notification ballot listing the twenty productions is sent to all members of the Cinematographers Branch who then vote for five black-and-white and five color productions in the order of their preference. The five productions in each class receiving the greatest number of votes become the nominations for final voting by the Academy Members.

As the evening of the Awards presentation ceremonies draws near, speculation as to which productions will win awards rises proportionately. Sometimes a production having a great number of nominations for achievement in various categories stands a better chance in the Awards than a film having but one. Thus, if such pictures also are nominated for best photography,

the record shows they stand better than an even chance of winning an award in this category. In light of this, it may be interesting to note the number of nominations which have been collected this year by the ten productions nominated for photographic awards:

Pictures	Nominations
Ben Hur	12
The Diary of Anne Frank	8
The Day After Tomorrow	7
Assignment: A Murder	7
Some Like It Hot	6
The Five Pennies	4
Forcy and Ben	4
The Big Fisherman	3
Carver	3
The Young Philadelphians	3

Screenings of the nominated films began February 27 at the Academy Award theatre, and award presentations will be made April 4 at the RKO-Pantages theatre in Hollywood.

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MGM CAMERA 65

Continued from Page 163

were compatible with all CinemaScope projector installations. The aspect ratio of the 35mm square prints made by the Panavision system from 65mm negatives was 2.55-to-1 instead of 2.35-to-1 (which is standard anamorphic practice today). The 35mm release prints of "Raintree County" possessed exceptionally fine quality because they were reductions from a 65mm negative photographed with exceptionally sharp Panatar lenses.

The first cameras used with the new lenses were built to Panavision specifications by the Mitchell Camera Corp. Basically, they were Mitchell standard cameras with 65mm movements. However, the movements were not sufficiently silent, so it was necessary for Panavision to build special blimps for these cameras for use on the sound stage. The walls of the blimps contain sound-proofing materials up to 8 inches thick and even though constructed of lightweight magnesium, the blimps weigh 300 lbs. without the camera.

Shooting began on "Raintree County" using the Panavision cameras, and subsequently Metro bought several of their own. Also, back in 1930, the studio had purchased several cameras from Mitchell for a 70mm widescreen process and had used them to photograph several features. These cameras, which had been lying around in storage at M-G-M, were converted by Mitchell from 70mm to 65mm and then used on the remainder of shooting for "Raintree," and later for "Ben-Hur."

All film exposed in the Ultra-Panavision process is shot on 65mm negative stock and printed on 70mm print stock. The release print stock is 35mm wider than the negative in order to accommodate the sound track on the outside of the sprocket holes; the area within the sprocket holes and the actual frame area are exactly the same on both the negative and release print strips.

By the time M-G-M was ready to start shooting on "Ben-Hur," a full complement of lenses for the new process had been designed and manufactured by Panavision. The focal lengths were 57mm, 75mm, 100mm, 150mm and 250mm. The 75mm is considered to be the standard lens of the system because its perspective very closely ap-

proximates that of the human eye.

When used to cover a negative 65mm wide these lenses produce an image twice the width of that of standard 35mm film. The angle of the 75mm lens, therefore, is more or less equivalent to a 37½mm lens used on 35mm cameras. The anamorphic design further reduces the focal length by a factor of approximately one-third in the horizontal axis, so that when we think of a 75mm lens used in the Ultra-Panavision system, it has no direct analogy to focal lengths used in standard 35mm photography. It is a much wider lens in the horizontal plane, but in the vertical plane, of course, the anamorphic factor has no power. However, the 65mm film does record a five-hole-high picture frame—which means that the 75mm lens is filling 20% more vertical area than on 35mm film. It therefore has the equivalent vertical angle of a lens of 20% shorter focal length, and the equivalent horizontal angle of a lens 50% shorter. It becomes evident that one must discard previous concepts of focal length when dealing with an anamorphic system as well as with a negative which has twice the area of a 35mm film in the width and 20% more area in height.

As "Ben-Hur" went into actual production a great deal of thought was given to the ultimate projection of the film. Panavision realized that in order to reproduce on the screen the sharp definition that was being recorded on film it would be necessary to have projection lenses of quality matching the taking lenses—otherwise, all the advantages inherent in the taking lenses would be nullified. A series of new lenses for 70mm projection were designed and then Panavision entered into an agreement with the very old and reputable Steinheil firm of Germany for their manufacture. Steinheil took Panavision's preliminary designs and recomputed the formulae to match the characteristics of the special high-density German glass which the company uses. Steinheil now manufactures the Panavision Steinheil Pan-Quinox lenses which are used on projections throughout the world wherever "Ben-Hur" is being shown. The new lenses, available in a range of different focal lengths, have a speed of $f/1.3$. Used in conjunction with large lamphouse projectors, similar to those used in drive-in theatres, it is possible to fill a screen over 100 feet wide with an extremely

brilliant image.

The photographing equipment used on "Ben-Hur" was of fine quality and produced an excellent result. Since then, Panavision has made radical changes in its lenses and equipment to insure greater versatility, and especially to make them lighter in weight and more economical for the producer to use. Panavision has also designed and built a series of new cameras of its own, which operate quietly, are only slightly larger than the studio cameras now in general use, and eliminate the need for the heavy, cumbersome blimps previously required. ■

REFLECTED LIGHT

Continued from Page 178

are covered with silver or aluminum leaf, sheet aluminum foil, or sheet metal. The aluminum leaf is best because the small squares break up the reflected beam of light and do not throw a concentrated hot beam as does a large smooth sheet of metal. When sheet foil is used, it is often crumpled slightly as it is applied to the reflector surface. This causes the reflected light to be broken up into a myriad of beams instead of a single "hot" beam.

For a softer reflected light, aluminum or chrome paint is applied to the reflector surface. Reflectors of this type can be used fairly close to a subject to throw fill light into the shadow side of the face or scene. Where light of still lesser intensity is desired, then a reflector surface of flat white paint is the most satisfactory.

Because more than one reflector is usually required in supplementing lighting for the average outdoor scene, it is advisable to design the reflector for portability and space saving. You'll want to be able to pack them into the trunk compartment of your car, along with the rest of your equipment, so plan them from that point of view.

The ideal reflectors are those which are rigid and can be propped up or mounted on a pedestal. Once set at the proper angle the cameraman can devote all his attention to his camera and subjects, shifting the reflector angles only when positions of the sun has changed sufficiently to require it.

A reflector of this type can be made by taking two panels of heavy cardboard, wallboard or quarter-inch plywood 15 by 30 inches in size and hinging them together. The cardboard and

wallboard panels may be hinged with bookbinder's cloth tape, which is gummed on one side and is easily applied. Small hinges should be used on the wooden plywood panels. Thus a "book" is formed which, when opened, becomes a flat panel 30 by 30 inches square—a false-sided reflector surface. Coat the inside surfaces of this folding, book-type reflector, using any of the materials previously mentioned. Choice, of course, will depend upon the intensity of the fill light you require. You will find it advisable to make at least three reflectors—two with hard surfaces, and one with a soft surface.

A means should be provided for holding the reflectors opened flat, and at an angle. Two lengths of one inch square wooden material will suffice for this: one piece to be temporary nailed or tacked across the back of reflector, while it is open, and the other to act as a prop to hold the reflector at the desired upright angle.

For extensive photography out of doors, a more rugged type of construction should be followed. Here the quarter-inch plywood material should be used. The panels should be spliced over frames made of $\frac{3}{4}$ "x1 $\frac{1}{2}$ " material securely nailed and braced. A wooden prop can be attached to each reflector by means of a small hinge, so that it is always in readiness for use.

The most common error resulting from use of reflectors by beginners is "washing out" natural shading. The neophyte, irritated by seemingly overcast days, is inclined to use his reflector, often conceals out total effects in an effort to get away from the overcast condition. But this practice should be avoided unless the footage is being shot especially to match that previously made on an overcast day. Some cinematographers hold that completely flat lighting has no character and this means to be the best way of denoting its lackluster quality. Light from reflectors should be concentrated on subjects out of doors only to obtain a pleasing balance.

Balance the lighting by eye, a viewing glass, or with the aid of an exposure meter. Either of the methods has arguments in its favor. You can make a choice after trying both and studying results on the screen. Matching by eye assumes that resultant tones harmonize with the rest of the scene. The background and nearer areas are automatically taken into consideration when the cameraman views his scene from

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camera position. For example: a medium shot in a mountain setting may contain a jagged rock formation in the background that has deep shadow patterns. If someone standing before it were illuminated with a very strong reflected light coming not from the angle of the sun, the lighting would appear quite unattractive. The subject would be lit out of key with the natural illumination of the surroundings. The problem would be to lighten up the overall scene, if possible, with very soft reflected light being used on the shadow side of the subject.

The reasons for using a light meter in lining up reflectors are formidable. Many cinematographers work for a controlled quality from one shot to the next, and ratios that are checked with a meter are sure to remain constant. A picture will project much smoother if the shots all have the same contrast ratio in common, although individual takes may not always be as effective as desired. A meter will also help secure more flattering skin tones when filming in color. A balance of 2:1 or 3:1 is usually a good standard for lighting with color film. A faster lighting tends to add weight to your subjects, while a contraindicator one often emphasizes unattractive features.

Controlled fill light, with the aid of reflectors, is perhaps most important in color photography where a darkened area appears even more separated from the highlight portions because of its deep color concentration. Shade or under-exposure often transforms colors to a new set of hues of much brighter saturation. In black-and-white photography, a dark area in a scene may be only a dark area on the screen, but with color film it often becomes a deep concentration of some very particular color. Too, scenes filmed in color in shaded areas tend to show a blue overcast and a decided blue in the highlights.

Reflectors, properly used can easily brighten these dark areas and eliminate or subdue the bluish effect. Daylight actually is a mixture of sunlight (yellow-end) and the skylight (blue). With the use of reflectors you can project the warmer sunlight into shadow areas of subjects and scenes not directly illuminated by the sun, furnishing needed balance in the lighting and, when color film is used, a measure of color correction, too. ■

PHOTOGRAPHIC ASSIGNMENTS

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DESIG STUDIOS—Culver City

- CHARLES BERRY, "Man with a Gun"™ (Desilu Prods.) with Charles Bronson.
CHARLES VAN ENDEL, ASC, "Body Heat Show"™ (Desilu Prods.) with Terry O'Quinn, Richard Kline, director.
HOWIE GREENGLASS, "Goddard Jury"™ (Desilu Prods.) with Lyle Bettger and Harold Stone. Sidney Martin, director.
EDWARD FITZGERALD, ASC, "The Gale Storm Show"™ (ITC Prods.) with Gale Storm and Zeke Felt. James Egan, director.
HAROLD SMITH, "Pony Express"™ (Desilu Prods.) Jack Yarrow, director.

DESIG STUDIOS—Gower

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ROBERT FRANK, ASC, "The Millionaire"™, James Sheldon, director.
PAUL HANCOCK, "The Train"™ (Desilu Prods.) with Roy Cavallone.
CHARLES STRAUSS, "The Untouchables"™ (Desilu Prods.) with Robert Stack and Jack Palance.
ROBERT PUTTACE, ASC, "Ace Squires Show"™ (Desilu Prods.) with Ace Squires.

DESIG STUDIOS—Hollywood

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ROBERT DE GRAZIA, ASC, "Dennis Thomas Show"™ (Desilu Prods.) with Dennis Thomas, Sheldon Leonard, director.
LOVEDAY WORTH, ASC, "The Real McCoy"™ (Bronson-Wynette Prods.) with Walter Brennan. Hy Averback, director.

DESIG STUDIOS

- HARRY WATMAN, "The Swiss Family Robinson"™ (Paramount & TFC); RITA VERA television, shooting in R. W. L. with John Mills and Dorothy McGuire. Ken Annakin, director.

FOX WESTERN AVENUE

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RALPH MOORE, ASC, "Cometballs"™ (Filmways Prods.).
ELLEN CARTER, ASC, "Cometballs"™ (Filmways Prods.).
FRANK REISMAN, ASC, "Furry Men"™ (CBS-TV) with Raymond Burr and Barbara Hale.
MARGARET MCGOUGH, "Bender Buntz"™ (Columbia Prods.) with Richard Widmark. John Poyson, director.
HARRY WOLF, "Hogan's Men"™ (Hemmings Prods.) with Jackie Cooper.

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ROBERT HALLER, ASC, "Girl on Death Row"™ (Paramount) American Int'l (Pict.) with Terry Moore and Laurel Auer. Ray Del Ruth, director.
FLOYD GORMY, ASC, "Fall of the House of Usher"™ (American Int'l Pict.) with Vincent Price and Mark Stamen.

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